

TAP 535- 1: Applying conservation of baryon and lepton number

Use the hadron and lepton cards to decide which particle is needed to complete each of the following reactions.

Assume that electric charge, baryon number and lepton number are all conserved in each reaction, and that the mass of the reactants cannot be less than the mass of the products.

1. $n \rightarrow p + e^- + \dots$

2. $\dots + n \rightarrow \dots + e^-$

3. $\pi^+ \rightarrow \mu^+ + \dots$

4. $p \rightarrow n + \nu_e + e^+$

Answers and worked solutions

1. $n \rightarrow p + e^- + \bar{\nu}_e$
allow any antineutrino.
2. $\nu_e + n \rightarrow p + e^-$
allow any antineutrino, and of course the scattering
 $e^- + n \rightarrow n + e^-$ is also a correct answer!
3. $\pi^+ \rightarrow \mu^+ + \nu_\mu$
allow any antineutrino
4. $p \rightarrow n + \nu_e + e^+$
allow μ^+